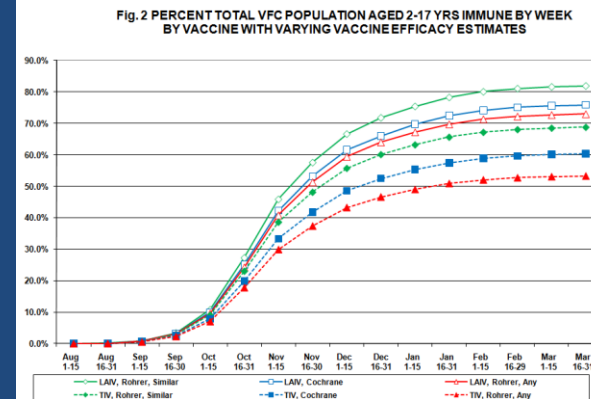
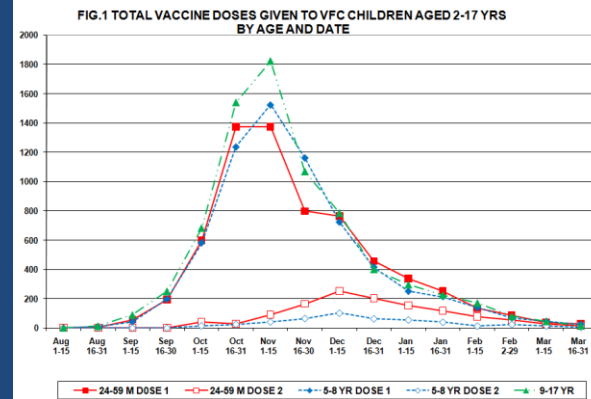


Optimizing Protection Against Influenza for VFC Children

Harry F. Hull, M.D., Heidi O'Connor, M.S.
HF Hull & Associates and University of Minnesota School of Public Health



Abstract

Background: Children eligible for the Vaccines for Children (VFC) program are immunized against influenza at lower rates and less likely to receive their second recommended dose. Live, attenuated influenza vaccine (LAIV) has higher vaccine efficacies (VE) than trivalent, inactivated influenza vaccine (TIV). Increased use of LAIV could provide better protection against influenza for this vulnerable population.

Methods: Published VE estimates and vaccine utilization data from a nationwide study of randomly selected pediatric practices were used to model percentages of VFC children that would be immune following immunization.

Results: 22,329 influenza vaccine doses were administered to 20,626 VFC-eligible children aged 24 months to 17 years in the study population. Among children recommended to receive 2 doses, only 1234 of 3018 (41%) aged 24-59 months and 469 of 1908 (25%) aged 5-8 years received their second dose. 73-83% of the vaccinated VFC population would be immune using LAIV compared to 53-68% with TIV. Differences in aggregate immunity were greatest among 24-59 month olds with 71-78% of LAIV immunized children immune compared to 48-60% with TIV. In this model, 29-47% more children aged 24-59 months would be immune prior to peak influenza season when vaccinated with LAIV.

Conclusions: Because VE is higher and most VFC children fail to receive their second recommended dose, population protection is substantially higher with LAIV. While LAIV cannot be given to all children, LAIV should be used preferentially for the VFC population, particularly for children aged 24-59 months and those needing 2 doses.

TABLE 1. RHORER VACCINE EFFICACY ESTIMATES ANY VIRUS REGARDLESS OF ANTIGENIC SIMILARITY

AGE	NEEDS 1 DOSE GOT 1 DOSE	NEEDS 2 DOSES GOT 2 DOSES	
		LAIV	TIV
24-59 M	76%	59%	72%
5-8 YR	76%	59%	72%
9-17 YR	76%		
TIV			
24-59 M	59%	31%	44%
5-8 YR	59%	31%	44%
9-17 YR	59%		

TABLE 2. RHORER VACCINE EFFICACY ESTIMATES ANTIGENICALLY SIMILAR VIRUSES

AGE	NEEDS 1 DOSE GOT 1 DOSE	NEEDS 2 DOSES GOT 2 DOSES	
		LAIV	TIV
24-59 M	87%	60%	77%
5-8 YR	87%	60%	77%
9-17 YR	87%		
TIV			
24-59 M	78%	32%	54%
5-8 YR	78%	32%	54%
9-17 YR	78%		

TABLE 3. COCHRANE VACCINE EFFICACY ESTIMATES

AGE	NEEDS 1 DOSE GOT 1 DOSE	NEEDS 2 DOSES GOT 2 DOSES	
		LAIV	TIV
24-59 M	79%	59%	79%
5-8 YR	79%	59%	79%
9-17 YR	79%		
TIV			
24-59 M	65%	35%	65%
5-8 YR	65%	35%	65%
9-17 YR	65%		

Methods

- VE estimates based on meta-analyses of influenza vaccination in children.
- Differences in VE between TIV & LAIV – 17-28% fully immunized, 23-29% partially immunized.
- Vaccine utilization data from a 2-year study of randomly selected pediatric practices.
- 42 practices in 2007-2008, 84 practices in 2008-2009.
- 2 years of data pooled to create a model year for calculating population immunity.
- Percentage of population immune calculated over time.
- Dec 31 used as cutoff date for vaccination as 80% of influenza seasons peak after that date.
- 88% of first doses and 49% of second doses given by Dec. 31.
- Few doses administered in Jan. - population immunity little changed with Jan 31 cutoff date.

TABLE 4. PERCENT POPULATION IMMUNE BY AGE, VACCINE AND VE EFFICACY ASSUMPTIONS ON DECEMBER 31

AGE	RHORER ANY STRAIN			RHORER SIMILAR STRAINS			COCHRANE		
	TIV	LAIV	% INCREASE PROTECTED POPULATION	TIV	LAIV	% INCREASE PROTECTED POPULATION	TIV	LAIV	% INCREASE PROTECTED POPULATION
	24-59 M	41.0%	60.4%	47.3%	51.5%	66.3%	28.7%	47.7%	62.6%
5-8 Y	45.7%	63.7%	39.4%	58.3%	71.0%	21.8%	51.3%	65.9%	28.5%
9-17 Y	52.4%	67.5%	28.8%	69.3%	77.3%	11.5%	57.8%	70.2%	21.5%
ALL	46.7%	64.0%	37.0%	60.2%	71.8%	19.3%	52.5%	66.0%	25.7%

Results

- Percentage of total VFC population immune increased by 19-37% using LAIV.
- Population immunity increased 29-47% for 24-59 m children and 22-39% for 5-8 y children.

Conclusions

- VFC children would be better protected against influenza by preferentially vaccinating them with LAIV.
- The greatest benefit will accrue to children aged 24-59 m and those recommended to receive 2 doses.
- LAIV may also be preferred for late season vaccination.

Discussion

- Our model based on real-world use of influenza vaccines.
- VFC children are vaccinated late and most do not receive their second dose of influenza vaccine, when recommended.
- LAIV has a higher efficacy than TIV for both fully and partially immunized children.
- Additional benefits of LAIV may include: protection against mismatched strains, protection for more than 1 season, immediate onset of protection, decreased viral shedding.
- 19-37% more children would be immune prior to onset of influenza season with LAIV.
- Increases in percentages of population immune with LAIV is higher than would be expected on differences in VE alone.
- Higher levels of population immunity with LAIV largely due to failure to receive 2nd dose, when indicated.
- LAIV more costly, but still cost effective in young children.
- VFC programs must continue to supply TIV for children <2 years and those with exclusionary medical conditions.

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